Ventilator - Associated Event Case Studies

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The following examples are for illustration purposes only and are not intended to represent actual clinical scenarios.

Case Study 1

A 69-year old female is seen in the ER and subsequently admitted to the ICU on a ventilator. Review her ventilator settings and determine if VAE criteria are met. If so, on what MV Day does the event occur?

MV Day	Daily minimum PEEP	Daily minimum FiO_2
1	8	100
2	6	50
3	5	50
4	6	40
5	6	60
6	6	60
7	5	60
8	5	60
9	5	60

There is not a ≥ 20 point change from MV day 3 to MV day 5

A. Yes
B. No

Case Study 1 (cont'd)

What if the settings were as follows?

MV Day	Daily minimum PEEP	Daily minimum FiO_2
1	8	100
2	6	50
3	5	50
4	6	40
5	6	70
6	6	70
7	5	60
8	5	70
9	5	60

A. Yes
B. No

Case Study 1 (cont'd)

The patient eventually develops a fever and is started on antibiotics. Does this meet the IVAC definition?

A. Yes
B. No

MV Day	Daily minimum PEEP	Daily minimum FiO_2	Temp Min	Temp Max	WBC Min	WBC Max	ABX
1	8	100					
2	6	50					
3	5	50	37.6	38	4.8	4.9	None
4	6	40	38.6	38.9	5.6	5.8	None
5	6	70	39	39.0	5.6	5.8	None
6	6	70	38.8	39.0	5.1	5.4	None
7	5	60	38.0	38.1	5.2	5.4	None
8	5	70					Yes
9	5	60					Yes

Case Study 1 (cont'd)

- **Temperature increase is met.**
- **Antibiotic was started outside the VAE Window Period.**

Case Study 1 (cont'd)

Does this meet IVAC definition?

MV DAY	Daily minimum PEEP	Daily minimum FiO_2	Temp Min	Temp Max	WBC Min	WBC Max	ABX
1	8	100					
2	6	50					
3	5	50	37.6	38	4.8	4.9	None
4	6	40	38.6	38.9	5.6	5.8	None
5	6	70	39	39.0	5.6	5.8	None
6	6	70	38.8	39.0	5.1	5.4	Yes
7	5	60	38.0	38.1	5.2	5.4	Yes
8	5	70					Yes
9	5	60					Yes

A. Yes

B. No

Case Study 1 (cont'd)

Let's assume the same patient (VAE event date on MV Day 5) had an increase in sputum production on MV Day 6.

Sputum was collected for C&S same day.

On MV Day 8 the report came back: scant normal flora with many *Staphylococcus aureus.*

A. IVAC

B. Possible VAP

C. Probable VAP

Case Study 1 (cont'd)

B. Possible VAP

MV DAY	Daily minimum PEEP	Daily minimum FiO_2	Temp Min	Temp Max	WBC Min	WBC Max	ABX	Speci-men	Polys /Epis	Organism
1	8	100								
2	6	50								
3	5	50	37.6	38.0	4.8	4.9	None			
4	6	40	**38.6**	**38.9**	5.6	5.8	None			
5	6	70	**39**	**39.0**	5.6	5.8	None			
6	6	70	**38.8**	**39.0**	5.1	5.4	**Yes**	Sputum		**Scant NF, Many *S. aureus***
7	5	60	38.0	38.1	5.2	5.4	**Yes**			
8	5	70					**Yes**			
9	5	60					**Yes**			

Case Study 1 Recap

- **Ventilated > 2 calendar days**
- **≥ 2 days stabilization or improvement**
- **≥ 2 days increase of ≥ 20 FiO_2**

VAC

- **Event day = MV Day 5 (first day of worsening)**
- **Within VAE Window Period (2 days before, day of, 2 days after)**
  - **Temp elevation**
  - **New antibiotics continued for ≥4 days**

IVAC

- **Met the culture requirement**

Possible VAP

Case Study 2

A 72 year old male is seen in the ER of Hospital A on May 2nd following a motor vehicle accident. He sustained closed rib fractures, ruptured spleen and dissection of the aorta.

In the ER, central lines and a Foley catheter were placed. He was admitted to Trauma ICU on that same day where he was intubated and stabilized at a PEEP setting of 6 cm H_2O and FiO_2 of 0.50 (50%).

On MV day 4 he required an increase in PEEP to 7.5 cm H_2O and FiO_2 to 0.80 (80%).

Utilize the information on the table to evaluate for VAE(s) answer the following questions:

Case Study 2 (cont'd)

Does the patient meet criteria for a VAE ?

MV Day	$PEEP_{min}$	FiO_{2min}
1	6	50
2	6	50
3	6	50
4	7.5	80
5	7.5	80
6	7.5	75
7	6	75
8	6	75
9	6	60
10	8	80
11	8	80
12	6	60
13	6	60
14	6	60
15	6	60
16	7.5	85
17	7.5	85
18	7.5	85

A. Yes
B. No

Case Study 2 (cont'd)

Identify the Ventilator-Associated Event(s) and date(s) of the event(s) for this patient:

MV Day	PEEP $_{min}$	FiO_2 $_{min}$	Temp $_{min}$	Temp $_{max}$	WBC $_{min}$	WBC $_{max}$	Abx	Speci-men	Polys / Epis	Organism
1	6	50								
2	6	50								
3	6	50	37.0	37.9	5.4	5.4	None	--	--	--
4	7.5	80	36.5	37.3	7.2	9.2	None	--	--	--
5	7.5	80	36.3	38.9	7.4	8.4	None	BAL	≥ 25 / ≤ 10	10^4 *Pseudo. aeruginosa*
6	7.5	75	37.2	38.5	8.5	8.8	Yes	--	--	--
7	6	75					Yes			
8	6	75					Yes	Blood	--	*Pseudo. aeruginosa*
9	6	60					Yes			
10	8	80					Yes			
11	8	80					Yes			
12	6	60					Yes			
13	6	60					Yes			
14	6	60					Yes			
15	6	60					No			
16	7.5	85					No			
17	7.5	85					No			

Case Study 2 (cont'd)

Identify the Ventilator-Associated Event(s) for this patient:

A. IVAC MV Day 4
B. Possible VAP MV Day 4
C. Probable VAP MV Day 4 and VAC MV Day 16
D. Probable VAP MV Day 4

Case Study 2 (cont'd)

D. Probable VAP MV Day 4

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Speci-men	Polys / Epis	Organism
1	6	50					None	--	--	--
2	6	**50**					None	--	--	--
3	6	**50**	37.0	37.9	5.4	5.4	None	--	--	--
4	7.5	**80**	36.5	37.3	7.2	9.2	None	--	--	--
5	7.5	**80**	36.3	**38.9**	7.4	8.4	None	BAL	**≥ 25 / ≤ 10**	**10^4 *Pseudo. aeruginosa***
6	7.5	75	37.2	38.5	8.5	8.8	**Yes**	--	--	--
7	6	75					**Yes**	--	--	--
8	6	75					**Yes**	Blood	--	*Pseudo. aeruginosa*
9	6	60					**Yes**	--	--	--
10	8	80					**Yes**	--	--	--
11	8	80					**Yes**	--	--	--
12	6	60					**Yes**	--	--	--
13	6	60					**Yes**	--	--	--
14	6	60					**Yes**	--	--	--
15	6	60					No	--	--	--
16	7.5	85					No	--	--	--
17	7.5	85					No	--	--	--

Case Study 2 (cont'd)

Does this patient develop a secondary bloodstream infection?

A. Yes
B. No

Case Study 2 (cont'd)

Event Period (14 Days)

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Speci-men	Polys / Epis	Organism
1	6	50					None	--	--	--
2	6	**50**					None	--	--	--
3	6	**50**	37.0	37.9	5.4	5.4	None	--	--	--
4	7.5	**80**	36.5	37.3	7.2	9.2	None	--	--	--
5	7.5	**80**	36.3	**38.9**	7.4	8.4	None	BAL	**≥ 25 / ≤ 10**	**10^4 *Pseudo. aeruginosa***
6	7.5	75	37.2	38.5	8.5	8.8	**Yes**	--	--	--
7	6	75					**Yes**	--	--	--
8	6	75					**Yes**	**Blood**	--	***Pseudo. aeruginosa***
9	6	60					**Yes**	--	--	--
10	8	80					**Yes**	--	--	--
11	8	80					**Yes**	--	--	--
12	6	60					**Yes**	--	--	--
13	6	60					**Yes**	--	--	--
14	6	60					**Yes**	--	--	--
15	6	60					No	--	--	--
16	7.5	85					No	--	--	--
17	7.5	85					No	--	--	--

Case Study 2 (cont'd)

Why no event on MV Day 16?

Event Period 14 Days

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Speci-men	Polys / Epis	Organism
1	6	50					None	--	--	--
2	6	**50**					None	--	--	--
3	6	**50**	37.0	37.9	5.4	5.4	None	--	--	--
4	7.5	**80**	36.5	37.3	7.2	9.2	None	--	--	--
5	7.5	**80**	36.3	**38.9**	7.4	8.4	None	BAL	**≥ 25 / ≤ 10**	**10^4 *Pseudo. aeruginosa***
6	7.5	75	37.2	38.5	8.5	8.8	**Yes**	--	--	--
7	6	75					**Yes**	--	--	--
8	6	75					**Yes**	Blood	--	*Pseudo. aeruginosa*
9	6	60					**Yes**	--	--	--
10	8	80					**Yes**			
11	8	80					**Yes**			
12	6	60					**Yes**			
13	6	60					**Yes**			
14	6	60					**Yes**			
15	6	60					No			
16	7.5	**85**					No	--	--	--
17	7.5	85	37.0	37.7	8.6	8.6	No	--	--	--

Only one event in a 14 day time period where the **date of event** is day 1

Case Study 2 Recap

- Ventilated > 2 calendar days
- ≥ 2 days stabilization or improvement
- ≥ 2 days increase of ≥ 20 FiO_2 or ≥ 3 PEEP VAC
- MV day 4 (first day of worsening) event date
- Within 4 day window (1 day before, day of, 2 days after)
  - Temp elevation — IVAC
  - New antibiotics continued for ≥4 days
  - Specimen collection - purulent secretions AND met culture requirement — Probable VAP
- Blood culture positive within 14 day event period with same organism isolated from a respiratory specimen — Secondary BSI
- Only one VAE within 14 day event period
- Event is attributable to Trauma ICU

Case Study 3

A 56-year old male is taken directly to the Operating Room from the Cath Lab following arrest during angioplasty procedure.

Quadruple bypass procedure is performed and he remains on the ventilator following surgery (MV Day 1). He has a central line and a Foley catheter in place when he arrives in the ICU that same day.

Case Study 3 (cont'd)

Identify the event(s) and date(s) of event(s) that occur for this patient:

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Specimen	Polys / Epis	Organism
1	6	30	37.1	37.6	4.3	4.3	None	--	--	--
2	6	30	36.8	37.2	4.6	4.6	None	--	--	--
3	6	30	37.0	37.9	5.4	5.4	None	--	--	--
4	8	30	36.5	37.3	7.2	9.2	None	--	--	--
5	8	35	36.3	37.2	7.4	12.5	None	BAL	≥ 25 / ≤ 10	10^4 *Enterococcus*
6	8	50	37.2	37.9	8.5	13.0	Yes	--	--	--
7	6	50	37.8	37.3	--	--	Yes	BC x2	--	*Enterococcus*
8	6	40	37.2	37.9	--	--	Yes	--	--	--
9	6	40	37.5	37.9	9.7	11.7	Yes	--	--	--
10	8	40	37.4	37.1	9.6	10.9	Yes	--	--	--
11	8	40	37.2	37.9	9.4	9.4	Yes	--	--	--
12	6	30	37.3	37.5	9.5	9.5	Yes	--	--	--
13	6	30	37.2	37.8	8.2	8.2	None	--	--	--
14	6	30	37.0	37.7	8.6	8.6	None	--	--	--
15	6	60	37.2	37.9	9.4	12.1	Yes	--	--	--
16	7	60	37.3	37.5	13.0	13..5	Yes	--	--	--
17	7	85	37.2	37.8	--	---	Yes	--	--	--
18	7	85	37.0	37.7	--	--	Yes	--	--	--

Case Study 3 (cont'd)

Identify the event(s) that occur for this patient:

A. MV Day 6 - Probable VAP
B. MV Day 6 - Possible VAP
C. MV Day 15 - IVAC
D. MV Day 15 - Probable VAP

Case Study 3 (cont'd)

C. MV Day 15 - IVAC

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Specimen	Polys / Epis	Organism
1	6	30	37.1	37.6	4.3	4.3	None	--	--	--
2	6	30	36.8	37.2	4.6	4.6	None	--	--	--
3	6	30	37.0	37.9	5.4	5.4	None	--	--	--
4	8	30	36.5	37.3	7.2	9.2	None	--	--	--
5	8	35	36.3	37.2	7.4	12.5	None	BAL	≥ 25 / ≤ 10	10^4 *Enterococcus*
6	8	50	37.2	37.9	8.5	13.0	Yes	--	--	--
7	6	50	37.8	37.3	--	--	Yes	BC x2	--	*Enterococcus*
8	6	40	37.2	37.9	--	--	Yes	--	--	--
9	6	40	37.5	37.9	9.7	11.7	Yes	--	--	--
10	8	40	37.4	37.1	9.6	10.9	Yes	--	--	--
11	8	40	37.2	37.9	9.4	9.4	Yes	--	--	--
12	6	30	37.3	37.5	9.5	9.5	Yes	--	--	--
13	6	**30**	37.2	37.8	8.2	8.2	None	--	--	--
14	6	**30**	37.0	37.7	8.6	8.6	None	--	--	--
15	6	**60**	37.2	37.9	9.4	**12.1**	**Yes**	--	--	--
16	7	**60**	37.3	37.5	13.0	13..5	**Yes**	--	--	--
17	7	**85**	37.2	37.8	--	---	**Yes**	--	--	--
18	7	85	37.0	37.7	--	--	**Yes**	--	--	--

Case Study 3 (cont'd)

Why no Event on MV Day 6?

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Specimen	Polys / Epis	Organism
1	6	30	37.1	37.6	4.3	4.3	None	--	--	--
2	**6**	**30**	36.8	37.2	4.6	4.6	None	--	--	--
3	**6**	**30**	37.0	37.9	5.4	5.4	None	--	--	--
4	**6**	**30**	36.5	37.3	7.2	9.2	None	--	--	--
5	**8**	**35**	36.3	37.2	7.4	**12.5**	None	**BAL**	**≥ 25 / ≤ 10**	**10^4 *Enterococcus***
6	**8**	**50**	37.2	37.9	8.5	**13.0**	**Yes**	--	--	--
7	**6**	**50**	37.8	37.3	--	--	**Yes**	BC x2	--	*Enterococcus*
8	**6**	**40**	37.2	37.9	--	--	**Yes**	--	--	--
9	6	**40**	37.5	37.9	9.7	11.7	**Yes**	--	--	--
10	8	40	37.4	37.1	9.6	10.9	Yes	--	--	--
11	8	40	37.2	37.9	9.4	9.4	Yes	--	--	--
12	6	30	37.3	37.5	9.5	9.5	Yes			
13	6	30	37.2	37.8	8.2	8.2	None			
14	6	30	37.0	37.7	8.6	8.6	None			
15	6	60	37.2	37.9	9.4	12.1	Yes			
16	7	60	37.3	37.5	13.0	13..5	Yes	--	--	--
17	7	85	37.2	37.8	--	---	Yes	--	--	--
18	7	85	37.0	37.7	--	--	Yes	--	--	--

No stability or worsening of oxygenation meeting defined parameters

Case Study 3 Recap

- **Must have at least 2 days stability followed by at least 2 days worsening criteria (≥20 FiO_2 or ≥ 3 PEEP when compared to preceding 2 days).**
- **All criteria for an event must be met within the VAE Window Period (usually 2 before, day of and 2 after onset of worsening).**
- **Continuation of Qualifying Antimicrobial Days (QADs) can occur outside the VAE Window Period.**

Case Study 3 (cont'd)

If there had been documented worsening on MV Day 5 and 6 would criteria for Possible or Probable VAP have been met?

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Specimen	Polys / Epis	Organism
1	6	30	37.1	37.6	4.3	4.3	None	--		--
2	**6**	**30**	36.8	37.2	4.6	4.6	None	--		--
3	**6**	**30**	37.0	37.9	5.4	5.4	None	--		--
4	**6**	**30**	36.5	37.3	7.2	9.2	None	--		--
5	**8**	50	36.3	37.2	7.4	**12.5**	None	**BAL**	**≥ 25 / ≤ 10**	**10^4 *Enterococcus***
6	**8**	50	37.2	37.9	8.5	**13.0**	**Yes**	--	--	--
7	**6**	**40**	37.8	37.3	--	--	**Yes**	BC x2	--	*Enterococcus*
8	**6**	**40**	37.2	37.9	--	--	**Yes**	--	--	--
9	6	**40**	37.5	37.9	9.7	11.7	**Yes**	--		
10	8	40	37.4	37.1	9.6	10.9	Yes	--		
11	8	40	37.2	37.9	9.4	9.4	Yes	--		
12	6	30	37.3	37.5	9.5	9.5	Yes	--		
13	6	30	37.2	37.8	8.2	8.2	None	--		
14	6	30	37.0	37.7	8.6	8.6	None	--		
15	6	60	37.2	37.9	9.4	12.1	Yes	--		
16	7	60	37.3	37.5	13.0	13..5	Yes	--		
17	7	85	37.2	37.8	--	---	Yes	--		
18	7	85	37.0	37.7	--	--	Yes	--	--	--

Excluded organisms can not be used to meet possible and probable VAP definitions. No secondary bloodstream infection.

Case Study 4

42 year old female dialysis patient was intubated and transferred from Hospital A to Hospital B on MV Day 1 for management of severe asthma exacerbations.

The patient had been receiving vancomycin for treatment of BSI.

Upon admission her temperature was 37.5^{0}C and WBC 5.6.

Case Study 4 (cont'd)

On MV Day 3 during dialysis treatment the patient developed a temperature of 39.7^{0}C.

On MV Day 5 she had increased respiratory secretions and an endotracheal aspirate was sent for culture and Gram stain.

On MV Day 7 imipenem was started.

Case Study 4 (cont'd)

MV Day	PEEP $_{min}$	FiO_2 $_{min}$	Temp $_{min}$	Temp $_{max}$	WBC $_{min}$	WBC $_{max}$	Abx	Speci-men	Polys / Epis	Organism
1	6	50	37.0	37.5	4.3	5.6	Vanco	--	--	--
2	5	40	37.0	37.2	--	--	None	--	--	--
3	6	40	37.2	39.7	--	--	Vanco	--	--	--
4	6	60	37.9	39.7	--	--	None	--	--	--
5	6	60	36.3	39.9	--	--	Vanco	ETA	≥ 25 / ≤ 10	Heavy *K. pneumoniae*
6	6	60	37.2	39.8	--	--	None	--	--	--
7	6	60	37.8	37.3	--	--	Imipenem	--	--	--
8	5	60	37.2	37.9	--	--	Imipenem	--	--	--
9	5	55	38	38	--	--	Imipenem			
10	6	60	37.9	37.9	--	--	Imipenem	--	--	--

Case Study 4 (cont'd)

Does this patient meet criteria for VAE, and if so, what type of VAE?

A. VAC
B. IVAC
C. Possible VAP
D. No VAE

Case Study 4 (cont'd)

A. VAC

MV Day	PEEP min	FiO_2 min	Temp min	Temp max	WBC min	WBC max	Abx	Specimen	Polys / Epis	Organism
1	6	50					Vanco	--	--	--
2	5	**40**					None	--	--	--
3	6	**40**	37.2	**39.7**	--	--	Vanco	--	--	--
4	6	**60**	37.9	**39.7**	--		None	--	--	--
5	6	**60**	36.3	**39.9**	--		Vanco	ETA	≥ 25 / ≤ 10	Heavy *K. pneumoniae*
6	6	**60**	37.2	**39.8**	--	--	None	--	--	--
7	6	60			--	--	Imipenem	--	--	--
8	5	60			--	--	Imipenem	--	--	--
9	5	55			--	--	Imipenem			
10	6	60			--	--	Imipenem	--	--	--

4-day VAE Window

Case Study 4 Recap

- **Ventilated > 2 calendar days**
- **≥ 2 days stabilization or improvement**
- **≥ 2 days increase of ≥ 20 FiO_2 or ≥ 3 PEEP**
- **MV Day 4 (first day of worsening) event date VAC**

- **Within 4 day window (1 day before, day of, 2 days after)**
  - **Temp elevation present**
  - **No new antibiotic continued for ≥ 4 days (vancomycin is <u>not</u> a new antibiotic and imipenem was started outside the VAE Window Period) NO IVAC**

- **Specimen collection - purulent secretions AND culture requirement is met but NO IVAC so NO Prob VAP**

Case Study 5

A hospitalized 78 year old male returned from the operating room on a ventilator following ventral hernia repair (MV Day 1).

On MV Day 4 the ventilator is removed at 1600 hrs.

The next calendar day (MV Day 5) he coded and was re-intubated at 1730 hrs.

The following day (MV Day 6) he develops a fever, and WBC count increases to 14.2. Cefepime is started and continued for 1 additional day, and then the patient is switched to piperacillin/tazobactam.

MV DAY	PEEP Min	FiO_2 Min
1	5	50
2	5	50
3	5	40
4	5	40
5	5	70
6	5	70
7	5	60
8	5	50
9	5	45
10	5	45

Case Study 5 (cont'd)

MV DAY	PEEP Min	FiO_2 Min	WBC Max	Temp	Antibiotic
1	5	50			
2	5	50			
3	5	40			
4 (extubated)	5	40			
5 (re-intubated)	5	70			
6	5	70	14.2	↑	Cefepime
7	5	60			Cefepime
8	5	50			Pip/Tazo
9	5	45			Pip/Tazo
10	5	45			Pip/Tazo

Case Study 5 (cont'd)

Based on the provided ventilator settings which of the following represents his VAE status?

A. IVAC, MV Day 5
B. VAC, MV Day 5
C. IVAC, MV Day 6
D. No VAE

Case Study 5 (cont'd)

B. VAC, MV Day 5

MV DAY	PEEP Min	FiO_2 Min	WBC Max	Temp	Antibiotic
1	5	50			
2	5	50			
3	5	40			
4 (extubated)	5	40			
5 (re-intubated)	5	70			
6	5	70	14.2	↑	Cefepime
7	5	60			Cefepime
8	5	50			Pip/Tazo
9	5	45			Pip/Tazo
10	5	45			Pip/Tazo

Case Study 5 Recap

- Patient was mechanically ventilated for some portion of each consecutive day --- one episode of mechanical ventilation.
- The period of stability is established the day before and the day of extubation—MV Day 3 and MV Day 4.
- The event day is the day of re-intubation—MV Day 5—first day of worsening oxygenation.
- While an increase in WBC is recorded, and a new antimicrobial (cefepime) is started, the cefepime is not continued for 4 consecutive days and the second antibiotic, piperacillin/tazobactam, is started outside the VAE Window Period.

Case Study 6

A 30 year-old female with a history of cerebral palsy, seizures and diabetes was admitted to MICU with respiratory failure.

She was ventilated on admission and stabilized.

On MV Days 3-6 her PEEP was stable at 4 cm H_20. On MV Day 7 her min PEEP was 8 cm H_20 and remained at 8 for the next 5 days.

A fever of 40.1^{0}C was documented on MV Day 8 and 9, and antibiotics were started on MV Day 9 and continued until MV Day 15.

Case Study 6 (cont'd)

On MV Day 8 an endotracheal aspirate (ETA) was collected. Gram stain revealed many neutrophils, rare epithelial cells, many gram positive cocci, few yeast and many gram negative rods.

The laboratory's semi-quantitative evaluation of this gram stain was indicative of purulent respiratory secretions.

On MV Day 9 a bronchoscopy was performed at which time a trans-bronchial biopsy (TBBx) was collected. The biopsy subsequently was reported to be growing *Candida albicans* ≥ 10^4 cfu/g.

How would you report these findings in NHSN?

Case Study 6 (cont'd)

MV DAY	PEEP Min	FiO_2 Min	Temp	ABX	Speci-men	Polys/ Epis	Organism
1	6	40					
2	5	40					
3	4	30					
4	4	30					
5	4	30					
6	4	30					
7	**8**	35					
8	8	60	40.1		ETA	Many/ Rare	
9	8	60	40.1	Yes	TBBx		*C. albicans* ≥ 10^4
10	8	60		Yes			
11	8	55		Yes			
12	8	35		Yes			

Case Study 6 (cont'd)

A. Possible VAP, MV Day 7
B. Probable VAP, MV Day 7
C. IVAC, MV Day 7
D. No VAE

Case Study 6 (cont'd)

B. Probable VAP, MV Day 7

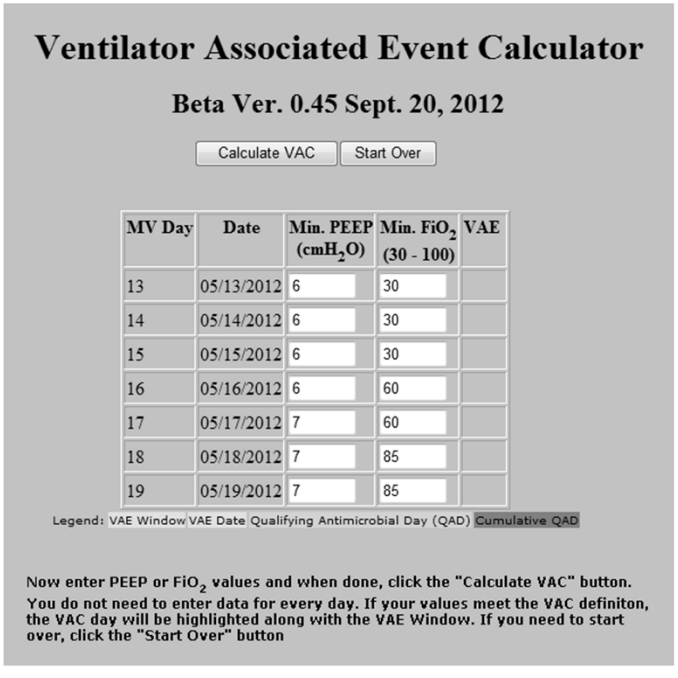
MV DAY	PEEP Min	FiO_2 Min	Temp	ABX	Speci-men	Polys/ Epis	Organism
1	6	40					
2	5	40					
3	4	30					
4	4	30					
5	4	30					
6	4	30					
7	**8**	35					
8	8	60	40.1		ETA	Many/ Rare	
9	8	60	40.1	Yes	TBBx		*C. albicans* ≥ 10^4
10	8	60		Yes			
11	8	55		Yes			
12	8	35		Yes			

Case Study 6 Recap

- **Meets IVAC definition with elevated temperature and antibiotic therapy**
- **Gram stain and trans-bronchial biopsy culture results satisfy criteria for Probable VAP**
- **Any organism isolated from lung tissue or pleural fluid is considered a pathogen. *Candida albicans* would be reported as the pathogen.**

JOB WELL DONE!!!!

Return to Case Study 3



Ventilator Associated Event Calculator

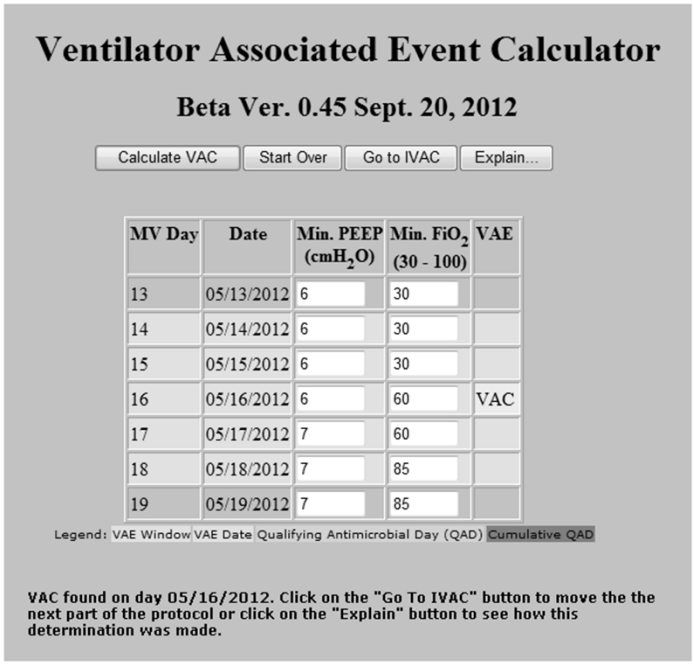
Beta Ver. 0.45 Sept. 20, 2012

Calculate VAC | Start Over

MV Day	Date	Min. PEEP (cmH_2O)	Min. FiO_2 (30 - 100)	VAE
13	05/13/2012	6	30	
14	05/14/2012	6	30	
15	05/15/2012	6	30	
16	05/16/2012	6	60	
17	05/17/2012	7	60	
18	05/18/2012	7	85	
19	05/19/2012	7	85	

Legend: VAE Window | VAE Date | Qualifying Antimicrobial Day (QAD) | Cumulative QAD

Now enter PEEP or FiO_2 values and when done, click the "Calculate VAC" button.
You do not need to enter data for every day. If your values meet the VAC definiton, the VAC day will be highlighted along with the VAE Window. If you need to start over, click the "Start Over" button



Ventilator Associated Event Calculator

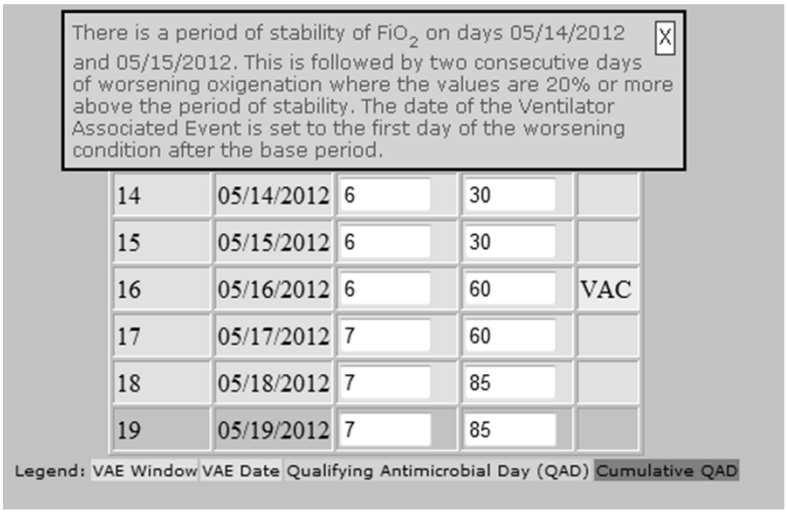
Beta Ver. 0.45 Sept. 20, 2012

Calculate VAC | Start Over | Go to IVAC | Explain...

MV Day	Date	Min. PEEP (cmH_2O)	Min. FiO_2 (30 - 100)	VAE
13	05/13/2012	6	30	
14	05/14/2012	6	30	
15	05/15/2012	6	30	
16	05/16/2012	6	60	VAC
17	05/17/2012	7	60	
18	05/18/2012	7	85	
19	05/19/2012	7	85	

Legend: VAE Window | VAE Date | Qualifying Antimicrobial Day (QAD) | Cumulative QAD

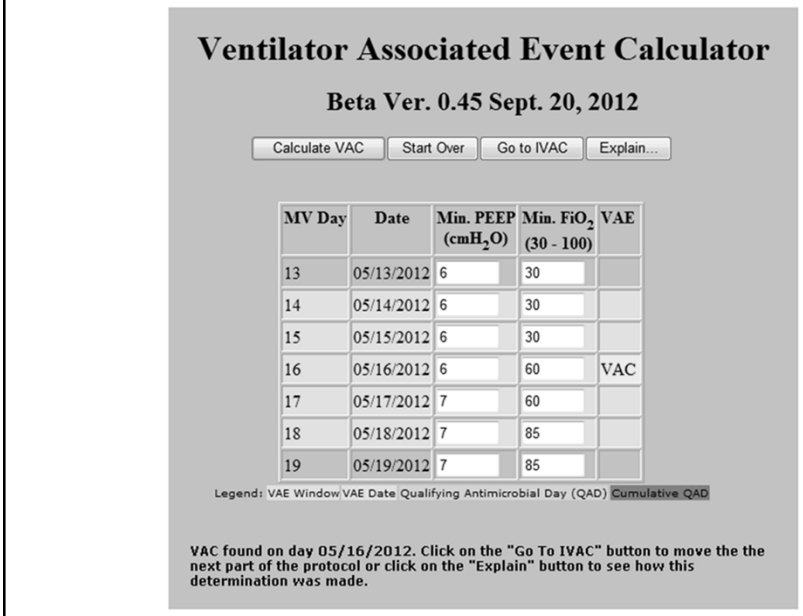
VAC found on day 05/16/2012. Click on the "Go To IVAC" button to move the the next part of the protocol or click on the "Explain" button to see how this determination was made.



There is a period of stability of FiO_2 on days 05/14/2012 and 05/15/2012. This is followed by two consecutive days of worsening oxigenation where the values are 20% or more above the period of stability. The date of the Ventilator Associated Event is set to the first day of the worsening condition after the base period. [X]

14	05/14/2012	6	30	
15	05/15/2012	6	30	
16	05/16/2012	6	60	VAC
17	05/17/2012	7	60	
18	05/18/2012	7	85	
19	05/19/2012	7	85	

Legend: VAE Window | VAE Date | Qualifying Antimicrobial Day (QAD) | Cumulative QAD



Ventilator Associated Event Calculator

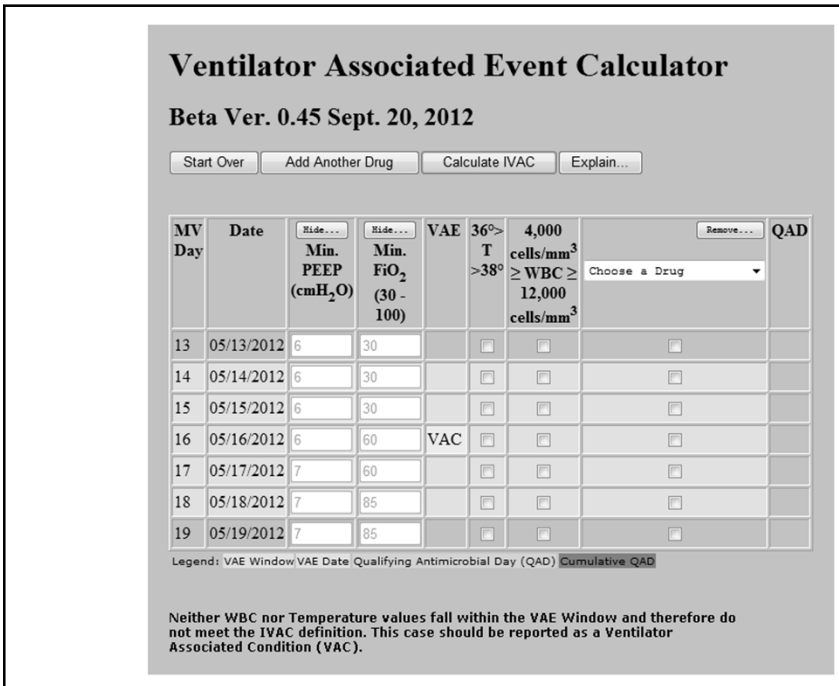
Beta Ver. 0.45 Sept. 20, 2012

Calculate VAC | Start Over | Go to IVAC | Explain...

MV Day	Date	Min. PEEP (cmH_2O)	Min. FiO_2 (30 - 100)	VAE
13	05/13/2012	6	30	
14	05/14/2012	6	30	
15	05/15/2012	6	30	
16	05/16/2012	6	60	VAC
17	05/17/2012	7	60	
18	05/18/2012	7	85	
19	05/19/2012	7	85	

Legend: VAE Window VAE Date Qualifying Antimicrobial Day (QAD) Cumulative QAD

VAC found on day 05/16/2012. Click on the "Go To IVAC" button to move the the next part of the protocol or click on the "Explain" button to see how this determination was made.



Ventilator Associated Event Calculator

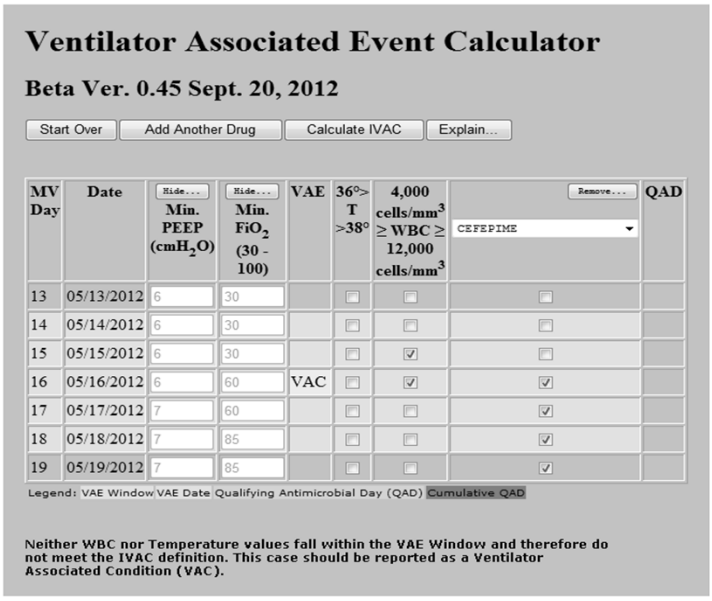
Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date	Hide... Min. PEEP (cmH_2O)	Hide... Min. FiO_2 (30 - 100)	VAE	36°> T >38°	4,000 cells/mm^3 ≥ WBC ≥ 12,000 cells/mm^3	Remove... Choose a Drug	QAD
13	05/13/2012	6	30		☐	☐	☐	
14	05/14/2012	6	30		☐	☐	☐	
15	05/15/2012	6	30		☐	☐	☐	
16	05/16/2012	6	60	VAC	☐	☐	☐	
17	05/17/2012	7	60		☐	☐	☐	
18	05/18/2012	7	85		☐	☐	☐	
19	05/19/2012	7	85		☐	☐	☐	

Legend: VAE Window VAE Date Qualifying Antimicrobial Day (QAD) Cumulative QAD

Neither WBC nor Temperature values fall within the VAE Window and therefore do not meet the IVAC definition. This case should be reported as a Ventilator Associated Condition (VAC).



Ventilator Associated Event Calculator

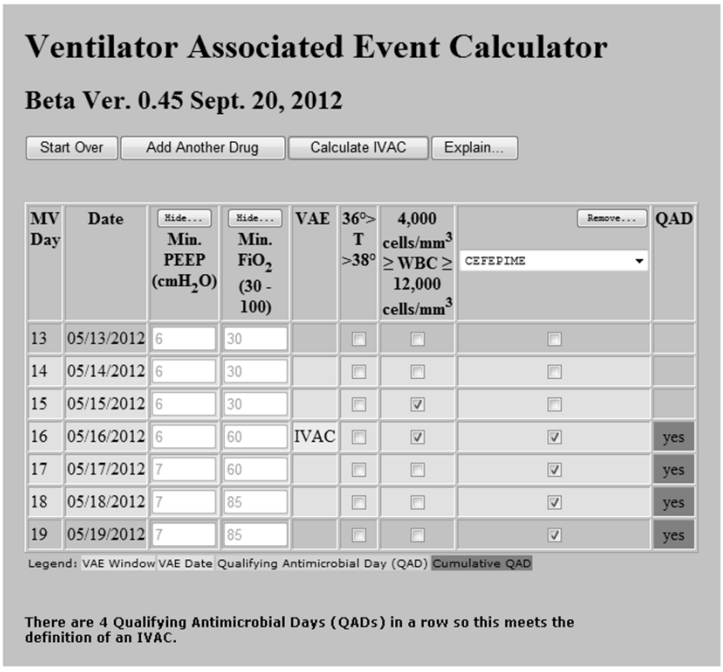
Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date	Hide... Min. PEEP (cmH_2O)	Hide... Min. FiO_2 (30 - 100)	VAE	36°> T >38°	4,000 $cells/mm^3$ ≥ WBC ≥ 12,000 $cells/mm^3$	Remove... CEFEPIME	QAD
13	05/13/2012	6	30		☐	☐	☐	
14	05/14/2012	6	30		☐	☐	☐	
15	05/15/2012	6	30		☐	☑	☐	
16	05/16/2012	6	60	VAC	☐	☑	☑	
17	05/17/2012	7	60		☐	☐	☑	
18	05/18/2012	7	85		☐	☐	☑	
19	05/19/2012	7	85		☐	☐	☑	

Legend: VAE Window | VAE Date | Qualifying Antimicrobial Day (QAD) | Cumulative QAD

Neither WBC nor Temperature values fall within the VAE Window and therefore do not meet the IVAC definition. This case should be reported as a Ventilator Associated Condition (VAC).



Ventilator Associated Event Calculator

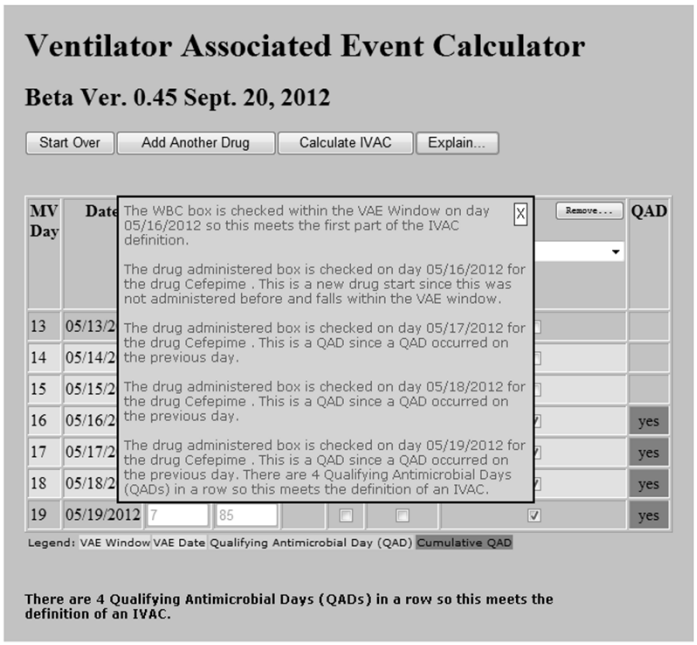
Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date	Hide... Min. PEEP (cmH_2O)	Hide... Min. FiO_2 (30 - 100)	VAE	36°> T >38°	4,000 $cells/mm^3$ ≥ WBC ≥ 12,000 $cells/mm^3$	Remove... CEFEPIME	QAD
13	05/13/2012	6	30		☐	☐	☐	
14	05/14/2012	6	30		☐	☐	☐	
15	05/15/2012	6	30		☐	☑	☐	
16	05/16/2012	6	60	IVAC	☐	☑	☑	yes
17	05/17/2012	7	60		☐	☐	☑	yes
18	05/18/2012	7	85		☐	☐	☑	yes
19	05/19/2012	7	85		☐	☐	☑	yes

Legend: VAE Window | VAE Date | Qualifying Antimicrobial Day (QAD) | Cumulative QAD

There are 4 Qualifying Antimicrobial Days (QADs) in a row so this meets the definition of an IVAC.



Ventilator Associated Event Calculator

Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date								QAD
13	05/13/2								
14	05/14/2								
15	05/15/2								
16	05/16/2								yes
17	05/17/2								yes
18	05/18/2								yes
19	05/19/2012	7	85		☐	☐		☑	yes

The WBC box is checked within the VAE Window on day 05/16/2012 so this meets the first part of the IVAC definition.

The drug administered box is checked on day 05/16/2012 for the drug Cefepime . This is a new drug start since this was not administered before and falls within the VAE window.

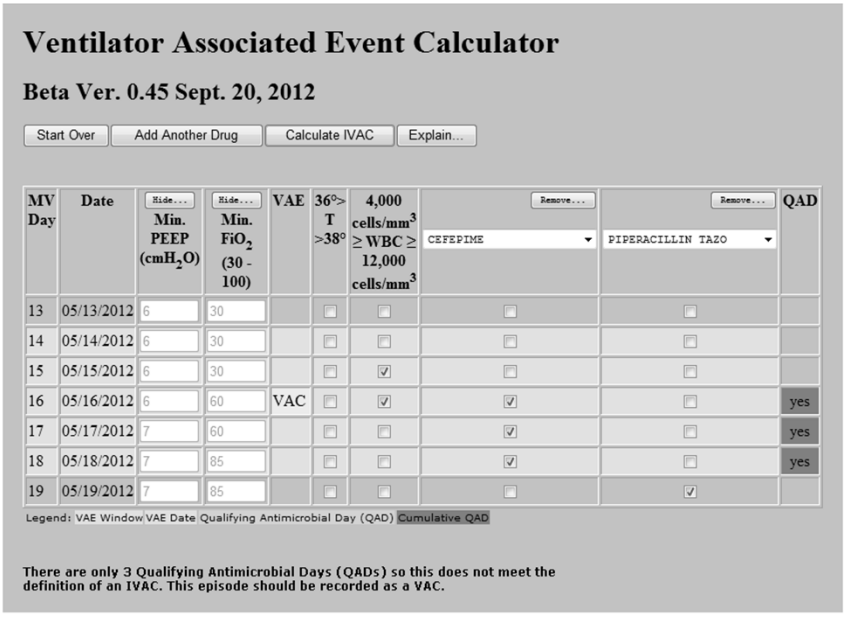
The drug administered box is checked on day 05/17/2012 for the drug Cefepime . This is a QAD since a QAD occurred on the previous day.

The drug administered box is checked on day 05/18/2012 for the drug Cefepime . This is a QAD since a QAD occurred on the previous day.

The drug administered box is checked on day 05/19/2012 for the drug Cefepime . This is a QAD since a QAD occurred on the previous day. There are 4 Qualifying Antimicrobial Days (QADs) in a row so this meets the definition of an IVAC.

Legend: VAE Window VAE Date Qualifying Antimicrobial Day (QAD) Cumulative QAD

There are 4 Qualifying Antimicrobial Days (QADs) in a row so this meets the definition of an IVAC.



Ventilator Associated Event Calculator

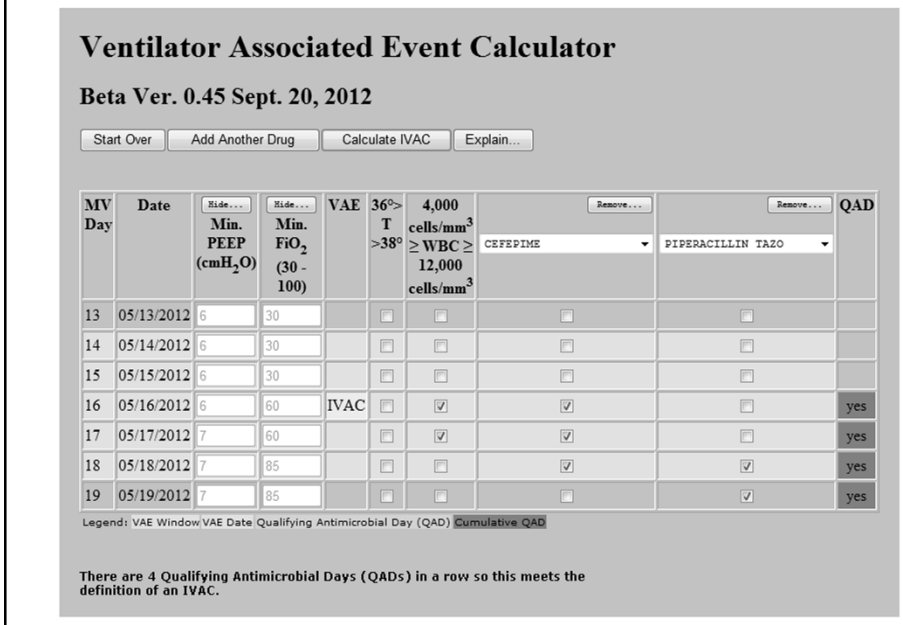
Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date	Hide... Min. PEEP (cmH_2O)	Hide... Min. FiO_2 (30 - 100)	VAE	36°> T >38°	4,000 cells/mm^3 ≥ WBC ≥ 12,000 cells/mm^3	Remove... CEFEPIME	Remove... PIPERACILLIN TAZO	QAD
13	05/13/2012	6	30		☐	☐	☐	☐	
14	05/14/2012	6	30		☐	☐	☐	☐	
15	05/15/2012	6	30		☐	☑	☐	☐	
16	05/16/2012	6	60	VAC	☐	☑	☑	☐	yes
17	05/17/2012	7	60		☐	☐	☑	☐	yes
18	05/18/2012	7	85		☐	☐	☑	☐	yes
19	05/19/2012	7	85		☐	☐	☐	☑	

Legend: VAE Window VAE Date Qualifying Antimicrobial Day (QAD) Cumulative QAD

There are only 3 Qualifying Antimicrobial Days (QADs) so this does not meet the definition of an IVAC. This episode should be recorded as a VAC.



Ventilator Associated Event Calculator

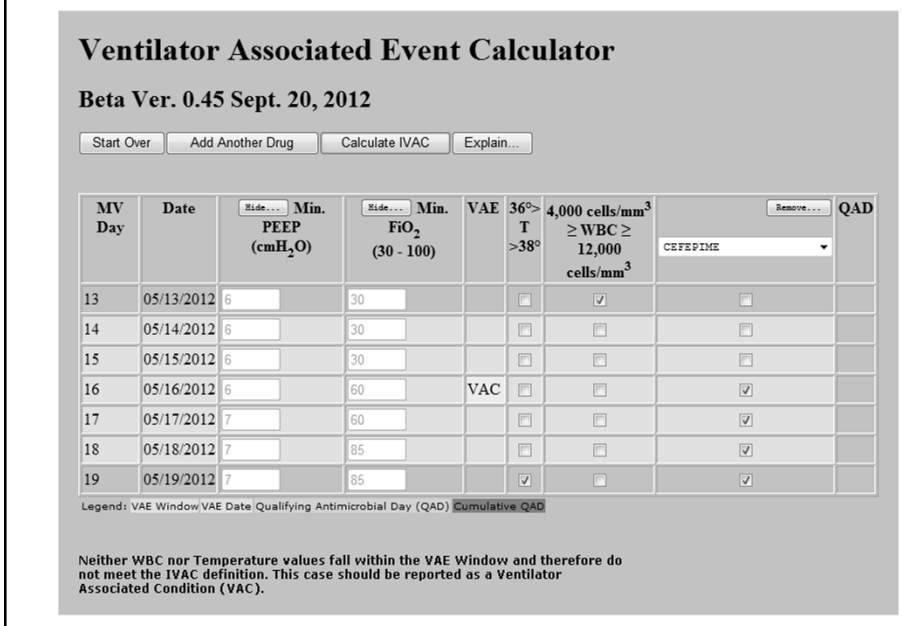
Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date	Hide... Min. PEEP (cmH_2O)	Hide... Min. FiO_2 (30 - 100)	VAE	36°> T >38°	4,000 cells/mm^3 ≥ WBC ≥ 12,000 cells/mm^3	Remove... CEFEPIME	Remove... PIPERACILLIN TAZO	QAD
13	05/13/2012	6	30		☐	☐	☐	☐	
14	05/14/2012	6	30		☐	☐	☐	☐	
15	05/15/2012	6	30		☐	☐	☐	☐	
16	05/16/2012	6	60	IVAC	☐	☑	☑	☐	yes
17	05/17/2012	7	60		☐	☑	☑	☐	yes
18	05/18/2012	7	85		☐	☐	☑	☑	yes
19	05/19/2012	7	85		☐	☐	☐	☑	yes

Legend: VAE Window VAE Date Qualifying Antimicrobial Day (QAD) Cumulative QAD

There are 4 Qualifying Antimicrobial Days (QADs) in a row so this meets the definition of an IVAC.



Ventilator Associated Event Calculator

Beta Ver. 0.45 Sept. 20, 2012

Start Over | Add Another Drug | Calculate IVAC | Explain...

MV Day	Date	Hide... Min. PEEP (cmH_2O)	Hide... Min. FiO_2 (30 - 100)	VAE	36°> T >38°	4,000 cells/mm^3 ≥ WBC ≥ 12,000 cells/mm^3	Remove... CEFEPIME	QAD
13	05/13/2012	6	30		☐	☑	☐	
14	05/14/2012	6	30		☐	☐	☐	
15	05/15/2012	6	30		☐	☐	☐	
16	05/16/2012	6	60	VAC	☐	☐	☑	
17	05/17/2012	7	60		☐	☐	☑	
18	05/18/2012	7	85		☐	☐	☑	
19	05/19/2012	7	85		☑	☐	☑	

Legend: VAE Window VAE Date Qualifying Antimicrobial Day (QAD) Cumulative QAD

Neither WBC nor Temperature values fall within the VAE Window and therefore do not meet the IVAC definition. This case should be reported as a Ventilator Associated Condition (VAC).

Thank you!

nhsn@cdc.gov

The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention.